Project Title: "Development of Protocols and Decision Support Tools for Assessing Watershed System Assimilative Capacity (SAC), in Support of Risk Based Ecosystem Management/Restoration Practices"

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Introduction to the problem: System assimilative capacity (SAC) is an important ecosystem characteristic for evaluating sustainability and assessing risk in a managed ecosystem. SAC also represents an important ecosystem restoration option. An appropriate evaluation of a systems capacity to assimilate a stressor or stressors, is needed before sound ecosystem management decisions can be made, particularly if active (intrusive) restoration practices are being considered.

Background: The U.S. EPA is currently conducting research on Lake Texoma, a Corps of Engineers lake on the Oklahoma/Texas border, to develop decision support tools and information to evaluate the transport and attenuation of contaminants and stressors in a lake ecosystem, and link them to observable ecological effects. Lake Texoma serves as a major recreational and drinking water resource for the southern Oklahoma and Northern Texas geographical area. The U.S. EPA is leading this research effort and is collaborating with the USGS, U.S. Army Corps of Engineers, University of North Texas (UNT), and Oklahoma University (OU) in collecting and analyzing data to target stressor inputs into Lake Texoma.

Objectives: The initial goal of the project will be to develop tools and information needed to evaluate the transport and attenuation of contaminants and stressors into the lake ecosystem and to link it to observable ecological effects. The final goal of the project will be to develop a model decision support system which would allow for risk based ecosystem/watershed management decisions by providing the information needed to evaluate the transport and attenuation of stressors types in the lake ecosystem, link it to observable ecological effects, and determine if the SAC is being exceeded.

Approach: A number of representative site and chemical sources will be characterized in detail. The potential release scenarios include LUSTs, landfills, and non-point sources such as agricultural sites for pesticides and fertilizers, and near-shore residential development areas. A detailed assessment of the transport and attenuation processes for different stressor scenarios will be developed. These assessments will be used to produce exposure indices based on location (transport path to lake), size (mass loading) and geological setting (attenuation values). Historical data, surveys and GIS will be used to evaluate the relative numbers and placement of potential stressors sources in the Lake Texoma watershed. Concurrent and coordinated ecological effects monitoring will be conducted to identify links, if present, between stressor input locations or events, and alterations in ecosystem functions. A GIS/stressor input/eco-effects database will be developed to allow for watershed level assessment of the potential risks to the Lake Texoma system. Evaluation of these data allow for the development of SAC determinations of various stressor types in the target watershed/ecosystem.

Accomplishments to date (02/26/03): Numerous physical, chemical, and biological datasets have been collected from study sites in around and the lake ecosystem by the participating collaborators. Data has been collected from both surface water and ground water locations. Over108 spatial datasets residing in 5 spatial databases have been collected and can be accessed and queried for GIS and modeling purposes. Historical water quality biological, and physical data were retrived from EPA's STORET database. This historical data will be used in conjunction with current data collected to identify possible links between past and present stessor inputs. A database management system is under development that will include all the data collected during the duration of the project, including data collected by collaborators.

Near future tasks: Efforts are under way include a study of the stream inflows from the watershed into the lake. This study not only focuses on the potential stressors, but also the flow volume into the lake after high and low rainfall events. This information will help support the development of the hydrologic model of the lake, that will eventually feed into the Lake Texoma Decision Support System.